R E M A R K S

The status of the claims and the text of pending claims, including original and currently and previously amended claims, have been given in the preceding section.

Claims 1-3, 5-10, 12-15 and 80-85 were rejected as unpatentable over HURWITZ et al. 6,280,640 alone or in view of PERKINS et al. 5,239,448. Claims 4, 11, and 16-17 were rejected in view of further references. Reconsideration and withdrawal of these rejections are respectfully requested.

Claim 1 is directed to a semiconductor device in which an interconnection board has a plate fixed thereto in direct contact with a majority of one surface of the board, where the plate has a higher rigidity than the board.

HURWITZ et al. disclose a device in which a board structure 10 has a base 12 fixed thereto in direct contact with a majority of one surface of the board structure. The Official Action acknowledges that HURWTIZ et al. does not explicitly teach that the base has a higher rigidity than the board structure.

The Official Action asserts that the base has a rigidity that is at least equal to the board structure because they are coextensive and integral. However, the joining of two materials does not change the rigidity of either, it establishes the rigidity of the combination. For example, fixing a piece of paper to a steel bar does not change the rigidity of the paper; the paper's rigidity is unchanged. The rigidity of the

combination of the paper and the steel bar is affected, not the rigidity of the paper. The claims provide that the plate has a higher rigidity than the board and this is a structural limitation that is not met by HURWITZ et al. Indeed, there is no teaching regarding rigidity of the base in HURWITZ et al. Mere mention of particular materials (HURWITZ et al. identifies various materials that can form the base) is not sufficient to infer rigidity because rigidity is also a function of dimensions of the material (e.g., the thickness of the base 12). One of skill in the art would not make any evaluation of the rigidity of the base relative to the rigidity of the board structure (whether it is more, less, or equal) because there is not sufficient information to do so.

The Official Action also asserts that it would merely be a matter of design choice to change the rigidity of the plate because applicant has not disclosed that the more rigid plate produces any unexpected results. However, the more rigid plate does produce results that are unexpected in view of the applied references. As discussed at pages 53-54, the use of a more rigid plate allows the layers in the interconnection board to be thinner, which means that the vias in those layers are not as deep, which means that the vias can be smaller and spaced closer together. Further, the decreased amount of flex in the board means that there is less likelihood that the board will flex and cause a misalignment of the vias. These advantages allow the

board to have a higher density of devices. None of this can be inferred from the applied references and thus the results achieved are unexpected. In view of this, there is no basis for asserting that one of skill in the art would find the change to a higher rigidity to be an obvious choice.

Indeed, there is no suggestion in HURWITZ et al. that rigidity plays any part in the selection of the base material and thus there is no suggestion in the reference that rigidity is a variable to be optimized. Since there is no suggestion to vary the rigidity of the base, it would not be obvious to attempt to optimize the rigidity.

Accordingly, it is believed that claim 1 avoids the §103 rejection over HURWITZ et al. alone.

PERKINS et al. discloses that a stiffener 40 may be used to provide a rigid base during construction of a multichip module that is formed on a flexible substrate 2. That is, this reference suggests that a stiffener may be appropriate when the substrate is flexible (an example of which is a single flexible layer of dielectric material, column 3, lines 56-57). The device in HURWITZ et al. includes an interconnection structure and a base that remains attached to the interconnection structure. One of skill in the art would not see this combination as flexible, in the sense that "flexible" is used in PERKINS et al., and thus there is no motivation, suggestion, reason, or teaching to use the PERKINS et al. stiffener with the HURWITZ et al. device.

That is, the HURWITZ et al. device already has a base 12 that is used for a particular purpose (preventing passage of electronic information, column 5, lines 26-27) and, to this end, remains with the device. The combination of the base 12 and the interconnect structure 10 in HURWITZ et al. would appear to provide suitable rigidity (recall that HURWITZ et al. does not discuss rigidity at all). The stiffener 40 does not appear to add anything to this combination and it unlikely that one of skill in the art would use a stiffener when making the HURWITZ et al. device.

Accordingly, it is believed that claim 1 avoids the §103 rejection over HURWITZ et al. in view of PERKINS et al.

Claims 2-17 and 80-85 avoid these rejections for the same reasons as claim 1 and withdrawal of the rejections of all of these claims is respectfully requested.

Claims 18-20, 22-37, 43-44, 50-53, and 55-59 were rejected as unpatentable over ALLEN et al. 4,705,205 in view of HAYASHI JP11-238972. Claims 21, 38-42, 45-49, and 54 were rejected further in view of TSUKAMOTO 5,841,194. Claims 18 and 43 have been amended and reconsideration and withdrawal of the rejections are respectfully requested.

Claim 18 has been amended to apply §112, sixth paragraph, to the interpretation of the buffer layer, now a buffer layer "means for" providing the electrical contact set forth in the claim and for absorbing the stress as set forth in

the claim. Various embodiments of the buffer layer means are disclosed in the specification. The combination of references does not disclose the same or equivalent structure as disclosed in the specification and thus the claimed "means for" is missing from the combination and would not be obvious to one of skill in the art.

ALLEN et al. disclose a device in which solder preforms 28 absorb stress applied to the external electrodes. The solder preforms 28 are columns that flex, such as shown in Figure 3B. In order to place the solder preforms 28 in the proper position, ALLEN et al. use a retaining member 22 that does not interfere with the motion of the preforms (column 13, lines 66-68). The retaining member 22 is there to hold preforms 28 and serves no other purpose. The solder preforms 28 appear to perform generally a similar function as claimed for the buffer layer means, but their column structure is not the same or equivalent to the layer structure of the present invention. The columns are tall and thin to flex while the layer absorbs the stress over a large area. HAYASHI adds nothing in this regard (it is relied upon for the suggestion to make the electrode pad flush) and thus the combination does not disclose or suggest the buffer layer means of amended claim 18.

Claim 43 has been amended to include the buffer layer and specific supporting plate of claim 44. ALLEN et al. do not disclose a device with both a buffer layer and a supporting plate

as now claimed and amended claim 43 avoids the rejections under §103. Note that the claim provides that there is an inter-space between the supporting plate and the buffer layer and thus these cannot be the same layer.

The Official Action takes the position that the supporting layer in ALLEN et al. is retaining member 22 and that the buffer layer is element 20. However, element 20 is the general designation for the preform placement device (column 12, line 42) that includes retaining member 22. Elements 20 and 22 in ALLEN et al. are the same and thus ALLEN et al. do not suggest the separate supporting plate and buffer layer now claimed. HAYASHI adds nothing in this regard and thus the combination does not disclose or suggest the supporting plate and buffer layer of amended claim 43.

In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

Respectfully submitted,

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